apply, is probably the most perfect of all when realisable. This is to make use of mirror or semi-mirror surfaces which reflect their surroundings and thus automatically imitate them. Such a device would be applicable in any surroundings.

The chief instance known to the author of the use of this method is afforded by the latest Zeppelins, which are reported to have a coating of bright aluminium powder, which reflects the sky and makes the vessel very difficult to detect at any considerable height. For aircraft flying at a height the problem of concealment is a particularly difficult one, as whatever pigment is adopted the framework is seen silhouetted against the bright sky. It is possible that by making use of reflecting surfaces, in addition to the other devices mentioned, this contrast could be considerably lessened. If to a noiseless engine could be added the quality of practical invisibility, aircraft would become very much more dangerous offensive machines than at present.

Such problems as those mentioned above seem to deserve careful scientific study. Methods of concealment may do much to save the lives of combatants. Moreover, the utility of all vessels employed for scouting purposes, whether aircraft, motors, or submarines, depends to a great extent on their escaping detection. It is therefore surely well worth while to follow up any train of research which offers any promise of approaching invisibility in the future. J. S. D.

PROF. W. H. H. HUDSON.

WE greatly regret to record the death, on September 21, of Prof. W. H. H. Hudson, at the age of seventy-six years. Born in London, he graduated as Third Wrangler in 1861. He was then fellow and lecturer of St. John's College until 1882, when he was appointed professor of mathematics at King's College, London. There, and also as professor of mathematics at Queen's College, Harley Street, he worked until his retirement about twelve years ago.

It is as a lecturer, and as a constructive reformer of the teaching of elementary mathematics that Prof. Hudson's vigorous influence will long be felt. Of his numerous pupils many became teachers, and the improvements in modern methods of teaching must be largely due to his inspiration. He edited Barnard Smith's "Arithmetic," published notes on dynamics, gave various addresses on the teaching of elementary mathematics, contributed to the mathematics of meteorology with a theory of anemoids, and did much to promote order and economy in the study of mathematics by adding to its vocabulary terms now generally found useful. He was an active member of the conference which reported to the London County Council on the teaching of arithmetic; of the councils of the London Mathematical Society and of the Mathematical Association; and of the governing body of Newnham College, in the welfare of which (as of the education of women generally) he was warmly interested.

Prof. Hudson's principles received remarkable vindication in the record of his family. By the tragic death on Snowdon, in 1904, of his only son, Cambridge lost one of its most brilliant Senior Wranglers, and perhaps the most widely accomplished. The researches of Ronald Hudson in Kummer's "Quartic Surface," published posthumously, placed him in the front rank of geometers. The three surviving daughters of Prof. Hudson have all distinguished themselves as mathematicians.

Few men intimate with the austerities of the most difficult of subjects can have made a wider circle of personal friends than did Prof. Hudson. He had the gift of humour and sympathy which endeared him to all those he taught. He enjoyed travel and recreation to the end of his days, and within the boundaries of mathematical study he knew how to find both.

NOTES.

THE Rev. Dr. E. W. Barnes, fellow and tutor of Trinity College, Cambridge, has been appointed to the mastership of the Temple. Dr. Barnes is in his forty-first year, and had a brilliant career at Cambridge. He went up to the University as a scholar of Trinity College, and in 1896 was bracketed second Wrangler. A year later he took a first class in the first division of the Mathematical Tripos, part ii., and was first Smith's prizeman in 1898, besides being president of the Union. He was elected a fellow of his college in the same year, and was an instructor at the Royal Military Academy, Woolwich, in 1898–99. He is the author of various memoirs and papers on Gamma functions, integral functions, linear difference equations, and related mathematical subjects.

THE Victoria Cross is given for conspicuous courage in the face of the enemy: and, if we want a good example of such courage, we have it in the English nurse, at the American Hospital at Neuilly, who inoculated herself with a pure culture of the bacilli of gas-gangrene, that she might help the discovery of the best treatment of that disease. We rejoice that she now is out of danger of death The annals of medicine record many similar instances of self-devotion, and doubtless there are others which have gone unrecorded. They have not always been of use to mankind: John Hunter, for example, inoculated himself with the virus of one of the venereal diseases, but drew a wrong conclusion from the results of the experiment. The amazing self-experiments with yellow fever, in Camp Lazear, were happily not in vain. The protective treatments against cholera, plague, and typhoid fever were of course, well tested by their discoverers on themselves before they were put to national uses. A good essay is waiting to be written on the whole subject of self-experimentation. Lord Moulton, in his evidence before the Royal Commission on Vivisection, discusses the ethics of it, and he does that very well. But formal ethics scarcely touch the case; the self-experimenter, in the presence of the enemy, the germs, the havoc they work on men, women, and children, "sees red," and behaves accordingly. We salute with reverence this big-hearted Englishwoman, but we beg of her that she will not do it again.

WE regret to learn of the death, on September 8, at eighty-one years of age, of Dr Ugo Schiff, professor of chemistry in the R. Istituto di Studi Superiori, Florence.

DR. C. H. WING, professor of chemistry at Cornell University from 1870 to 1874, and at the Massachusetts Institute of Technology from 1874 to 1884, died recently at the age of seventy-nine.

THE death is announced, in his fiftieth year, of Dr. K. E. Guthe, professor of physics at the State University of Iowa from 1905 to 1909, and at the University of Michigan since the latter date. A native of Hanover and educated in Germany, he went to the United States in 1892. He was a member of the jury of awards (electricity) at the St. Louis Exposition in 1904, and had made several contributions to the literature of physics.

NATURALISTS, and especially ornithologists, throughout the British Islands are the poorer for the sudden death on September 15 of Mr. R. M. Barrington, of Fassaroe, Bray, Co. Wicklow. Though in his sixty-seventh year, he was still full of activity and of enthusiasm for his favourite studies. An admirable example of the "all-round" naturalist, Mr. Barrington will be especially remembered for his work on the migration of birds. From 1880 he collected specimens forwarded to him by lightkeepers around the Irish coasts, and the results of these observations were published in a substantial volume in the year 1900. Many birds were thus recognised for the first time as Irish species—such as the yellow-browed warbler, the aquatic warbler, the barred warbler, Pallas's grasshopper warbler, the short-toed lark, the shore-lark, the mealy and Greenland redpolls. The specimens accumulated were either passed on to the National Museum in Dublin, or preserved in Mr. Barrington's beautifully kept private museum at Fassaroe, in which he took great pride and pleasure, and which he was always ready to show to friends, expounding the while from the wide experience with which his memory was stored. He was a keen botanist, having in his younger days paid especial attention to the Alpine plants of Ireland. He threw himself heartily into many enterprises for extending biological knowledge and interest, having been one of the founders of the Dublin Naturalists' Field Club, and a valued member of council of the Royal Irish Academy, the Dublin Society, and the Zoological Society of Ireland. To his wide knowledge of natural history there were added a personal charm and a kindly humour which will make the memory of his friendship a high privilege.

IT has been found that at the present time there are three main causes which delay the production and repair of aircraft and their parts, namely, lack of co-ordination between those engaged in aeroplane construction, difficulties of finance, and shortage and wastage of labour. To remedy these disadvantages, it is proposed to establish a central body under the title "Aeronautical Production Committee" or some similar name, the functions of which will include the promotion of co-operation and co-ordination in the aeronautical industry, the provision of technical assistance otherwise unobtainable for financial institutions, and the development of arrangements for the better utilisation of the existing labour and the training of as many men for aeronautical work as the situation demands. It is estimated that an expenditure of about 100*l.* per week would enable the committee to supply the Army and Navy with seven more aeroplanes every week, and it is suggested that the sum might be raised partly by a Government subsidy, partly by a small fee charged to the makers for the benefits they would derive from the central bureau, and partly by voluntary subscriptions. The scheme has received the support of many eminent authorities, and further particulars can be obtained from the temporary secretary, Mr. L. Blin Desbleds, 39 Victoria Street, Westminster, S.W.

JUST before five o'clock on Thursday morning last, September 23, a fire was discovered in the Technical School buildings, Market Street, Newton Abbot, and although the firemen succeeded in confining the outbreak to one room, much damage was done to the school museum, which included the life-long collection of the late Mr. W. Vicary, of The Priory, Exeter, bequeathed some years ago to his nephew, Mr. W. Vicary, chairman of the governors of the Technical School. The collection was considered to be one of the finest out of London, and many specimens were believed to be unique. It included thousands of specimens of minerals, some being very fine and rare. There were also some fine old flints from Dartmoor, stone implements, and a valuable collection of corals. Specimens from all parts of the world were included in the collection, and many cannot be replaced. There was also an extensive collection of butterflies of numerous varieties, and some magnificent examples of sampler work, some dating from the sixteenth century. The massive cases, valued at about 300*l.*, were completely destroyed, and it is probable that the bulk of the collection is rendered useless by the great heat. Other things lost are the records of the school from 1868, the year of its inception, and a collection of photographs, most of which cannot be replaced, of people who have been connected with the school.

A HOME Grown War Food Exhibition, organised by the *Daily Mail*, was held at the Horticultural Hall, Westminster, last week. When it is considered that the growth, development, and power to function of all the tissues of the body are derived directly from the foodstuffs ingested, there need be no apology for investing these substances with an importance of the first order. To say that the exhibition was a success falls far short of the whole truth It has demonstrated that British people in their thousands (there were more than 20,000 competitors) can produce wheat, vegetables, eggs, butter, cheese, honey, and jams in quality as fine as any other nation in the world. Whether most of these foodstuffs can be produced as cheaply in this country as in France and

Germany remains to be seen. In agriculture, as in art and most departments of human activity, the French do things with singular brilliance and address. Now that we are drawn so closely to France, our agriculturists have excellent opportunities for studying her methods in the various ramifications of their calling. There is evidence to show that the freshness of food plays an important *rôle* in nutrition and problems of health. Since certain vegetables and fruits cannot be imported (even from the Continent) in a thoroughly fresh state, it follows that they should be raised at home. Apart from cost of carriage, there is no reason why we should not produce all our kitchen-garden material, many fruits, eggs, and butter and cheese as cheaply as any nation on the Continent. It requires no argument to-day to establish the contention that the health and physical conditions of the workers in this field are immeasurably better than in any sphere of activity afforded by the city. The only suggestion we have to make relating to the exhibition is that if a label bearing the name of the particular variety of foodstuff were attached to each exhibit, it would afford some valuable information to competitors and visitors. We should now like to see a further exhibition in the form of practical demonstrations of how the various foodstuffs should be cooked.

THE destruction of housefly maggots in manure and other food-stuffs is nowadays a pressing question with sanitary officers. Some recent American experiments are described in Bulletin 245 of the U.S. Department of Agriculture, written by Messrs. F. C. Cook, R. H. Hutchison, and F. M. Scales. Borax and powdered hellebore are found to be the most effectual "larvicides" of all the substances tested.

THE Trustees of the British Museum (Natural History) have published a valuable little pamphlet (Economic Series, No. 2), by Mr. Bruce F. Cummings, on the louse and its relation to disease. The structural distinctions drawn between the head louse and the clothes louse will be of interest to systematic entomologists, while the practical importance of the parasites as carriers of typhus and other diseases is duly emphasised.

THE Food Plants of the Gipsy Moth (*Porthetria dispar*) in America form the subject of Bulletin 250 of the U.S. Department of Agriculture by Mr. F. H. Mosher. From the careful experiments that he describes it has been established that the caterpillars eat, and thrive on, forty or fifty different kinds of trees. It is evident that such discursive feeding-habits make attempts to destroy the insects more difficult.

THE asparagus-beetle (*Crioceris asparagi*) is a well-known pest in Europe and North America. The life-history of its chalcid parasite, *Tetrastichus asparagi*, as lately described by Mr. F. A. Johnston (Journ. Agric. Research, Washington, vol. iv., No. 4), is of remarkable interest. The tiny fly lays usually from five to seven eggs in an egg of the beetle. The beetle's egg nevertheless hatches; the larva becomes fully grown, and, entering the soil, forms a pupal chamber. It never pupates, however, as the chalcid grubs have been feeding and growing within it; they crawl out of the dried cuticle and pupate in the earthen chamber which the host-larva has made.

AN interesting account of the colony of grey seals (*Halichoerus grypus*) of Skerryvore is given in the *Scottish Naturalist* for September by Mr. R. Wilson, of the Skerryvore Lighthouse. This colony, numbering from sixty to eighty, takes up its residence on the outlying rocks every summer, the majority leaving before the winter sets in. Among other things, he refers to their pugnacity towards one another, at any rate so far as the bulls are concerned, and of their curiosity.

THE *Zoologist* for August contains several interesting ornithological papers. Dr. J. M. Dewar discusses the relation of oyster-catchers to their environment from observations made along the Firth of Forth; he finds that the access of the birds to their feeding-grounds in winter is largely dependent on the movements and activities of the human population of the district. The Rev. J. M. McWilliam describes the habits of the tree sparrow in Co. Donegal, mentioning that a couple of males were observed feeding young in one nest, while a lonely female "was sitting on another nest not very far away." Mr. E. Selous continues his "Diary of Ornithological Observations" made in Iceland.

FURTHER notes on the colour sense in bees, from the pen of Mr. C. B. Moffat, appear in the *Irish Naturalist* for September. Mr. Moffat is of opinion that colour is a negligible factor as a means of guiding bees in their search for nectar. They depend rather, he believes, on some subtle sense, perhaps of scent, which enables them to keep to plants of one particular species during each separate journey to the hive. On the return from the hive plants of another species may be visited. Plants of the same species bearing respectively, say, pink and white flowers are visited in succession and at random, but neighbouring plants of different species, bearing flowers of the same hues, are avoided.

EXTENSIVE areas of floating oil off the east coast of Scotland have caused the death of enormous numbers of guillemots, razorbills, and puffins, and a considerable number of eider-ducks. Details as to this extraordinary occurrence appear in the *Scottish Naturalist* for September. Lady Erskine reports that on June 22 at Kingsbarns the rocks were covered with a thick, brown oil, some seven inches deep in the crevices. Dead birds were lying all along high-water mark, and large numbers in a dazed condition, and, with their feathers matted together with oil, were sitting about. Some eiders were also found in a similar pitiable plight. The keeper of the Isle of May lighthouse, on June 16, found birds similarly coated on the rocks, and unable either to fly or swim. Large sheets of oil drifted to the island, and all the creeks on the east side were full of it. The Misses Rintoul and Baxter on June 29 found hundreds of dead guillemots, razorbills, and puffins, and some eiders, on the shore at Cambo. They also report further victims from Largo

Bay and round the shores of Fife. In all these cases the birds were unable either to fly or dive, and hence died of starvation. So far no explanation of this floating oil has come to hand. Probably it escaped from a torpedoed ship bearing a cargo of lubricating oil.

The current number of the *Quarterly Journal of Microscopical Science* (vol. lxi., part ii.), though considerably diminished in size, contains some very interesting matter. Mr. E. S. Goodrich's article on the chorda tympani and middle ear in reptiles, birds, and mammals should be welcomed by all students of comparative anatomy. In these days of embryological hair-splitting it is refreshing to find that he is able to give a whole-hearted adherence to the much debated theory that the stapes and columella are derived from the hyoid arch, while the incus and malleus correspond to the quadrate and articular respectively. The attention of teachers may be directed to some extremely useful diagrams contained in this memoir, especially text-figure 2, showing the relations of the auditory ossicles and associated structures in reptiles and mammals. Another article in the same number, dealing with the placenta of a lemur, is from the pen of the brilliant Oxford embryologist, Dr. J. W. Jenkinson, whose recent death while fighting in the service of his country is so deeply to be deplored.

W. H. Brown and D. M. Mathews, in the *Philippine Journal of Science* (vol. ix., Nos. 5 and 6, pp. 413–561), give the results of an elaborate study of the Dipterocarp forests of the Philippine Islands. At low elevations throughout the Indo-Malayan region, the important forests, capable of yielding an extensive supply of timber, are those in which the dominant trees belong to the family Dipterocarpaceæ. Forests of this class occur in the Philippines from sea-level to 2500 ft. elevation, and cover an area of 30,000 square miles. Different types occur, the ecological and silvicultural features of which are well described by the two authors, who give numerous tables of the rates of growth of the main species, and discuss at great length the most suitable methods of utilising the timber, which will ensure successful natural regeneration on the felled areas. Artificial replanting appears to be impracticable. The prevalent opinion that most of the woods of the tropics are very hard and heavy, and consequently only fit for ornamental uses, is not supported by these investigations. On the contrary, it is believed that enormous supplies of soft and light timbers, just as suitable for building purposes as the pine and spruce of northerly regions, will eventually be procured from the tropical Dipterocarp forests, which often consist of dense stands of a few species, that may be logged at a small cost. An export trade in such timber from the Philippine ports has lately been rendered possible by the introduction of cheap American machinery.

The last issue (1913–14) of the *Bulletin Hydrographique*, published in Copenhagen by the Conseil permanent international pour l'Exploration de la Mer, contains physical observations taken, chiefly in the North Sea, from July, 1913, to June, 1914. The volume includes an admirable series of finely executed maps illustrating salinities and currents, the former in the North Atlantic as well as the North Sea. The current observations are discussed at some length, but the available data are still insufficient to allow laws to be formulated with regard to mean current conditions. Unfortunately, the war has interrupted this international effort, but it is to be hoped it will be continued later. At most stations measurements have been made at 10 metres' depth and near to the bottom, and at fortnightly intervals for three years. The tidal current seems to be least in the Skagerak and the northern central part of the North Sea, greater in the vicinity of the coasts and in the eastern and western parts, and greatest in the southern portion between the Channel and 53° N.

In *Naturen* for July and August, 1915, C. F. Kolderup discusses and illustrates the Devonian flora of Vestland, between the Nordfjord and the Sognefjord of Norway, on the basis of his researches from 1899 onwards, aided by material in the University collections at Kristiania. The plant-remains confirm the older suggestions as to the age of the sandstones and conglomerates, and the presence of the Orcadian *Thursophyton milleri*, which is probably a Lycopodiale, suggests a Middle Devonian horizon.

Discussions of the anemographic observations recorded at Deesa from January, 1879, to December, 1904, and at Karachi from January, 1873, to December, 1894, by W. A. Harwood, are given in vol. xix. of the Memoirs of the Indian Meteorological Department; the discussions are numbered respectively VII. and VIII. There is an introduction by Dr. G. T. Walker, and descriptions are given of the two stations. The year at Deesa is divided into three seasons: the cool season, October to February; the hot season, March to May; and the rainy or south-west monsoon season, from June to September. As each season has its characteristic winds, the data are discussed under the three divisions. At Karachi the year is divided into similar seasons, which embody similar months to the discussion at Deesa. The greatest air movement at Deesa corresponds to the direction of maximum frequency throughout the year. It is north-east in the cool season, and shifts round through west during the hot season to south-west in the rains. At Karachi the predominant movement and the highest velocities are recorded from south-westerly directions at all seasons. The hourly velocities and co-ordinates of wind movement are given for each month for each of the two stations, and there are monthly wind-roses and other diagrams.

We are glad to see that the war has not interfered with the publication of that very useful periodical, the Journal of the Royal Microscopical Society. In addition to the usual summary of current researches, the August number (part iv., 1915) contains an interesting article by Mr. Charles Singer on the "Dawn of Microscopical Discovery," with reproductions of some microscopical drawings of early date and portraits of some of the pioneers of microscopical science. According to the author, the pioneer period, with which his article exclusively deals, terminated about the year 1660, and was succeeded by the classical period, in which flourished the great microscopists Hooke, Grew, Malpighi, Leeuwenhoek, and Swammerdam. Amongst the pioneers themselves are included such well-known names as Fabio Colonna, Galileo Galilei, Federigo Cesi, and Athanasius Kircher.

The June number of *Terrestrial Magnetism and Atmospheric Electricity* contains the results of the measurements of the deviation of the magnetic compass from true north made on the magnetic survey ship *Carnegie* during her voyage from Brooklyn to Honolulu *viâ* the Panama Canal in the spring of this year. The corrections to the British Admiralty Chart are very small over the course from Brooklyn to the West Indies, but in the neighbourhood of the passage between Dominica and Porto Rico the chart gives the westerly deviation more than a degree too small. Across the Caribbean Sea the chart is within a few tenths of a degree of the Carnegie results, but in the first 30° of the course across the Pacific our charts give the easterly deviation about a degree too small. At greater distances from the American coast the error falls to one or two-tenths of a degree, and is sometimes an excess, sometimes a deficit, in the easterly deviation.

In the Journal of the Franklin Institute for September, Mr. W. S. Bartholomew, president of the Locomotive Stoker Company of Schenectady, says that under average conditions any locomotive, freight or passenger, which has a maximum tractive effort of 50,000 pounds, or burns 4,000 pounds or more of coal per hour for an extended period, one hour or more, should be fired by mechanical stoker. It appears that about 1,200 locomotives in the United States have had mechanical stokers fitted, and about one thousand of these were in use in April last. Some six hundred are Street stokers of the over-feed type, and 365 are Crawford stokers of the under-feed type. It is claimed that the mechanical stoking of locomotives raises the efficiency of the locomotive by increasing the earning power, and also raises the efficiency of labour by making it possible for one crew to handle more traffic per train unit, or the same train unit with greater ease. It also lessens the arduous physical labour of the fireman, and lifts the grade of his employment.

The *Engineering Magazine* for September contains the first of a useful series of articles by Prof. J. C. Smallwood on recording power plant operations. Descriptions are given of coal meters, feed-water meters, and steam-flow meters; these are thoroughly well illustrated from photographs and working drawings, and contain much information of value to engineers. Coal-weighing apparatus may be classed as registering meters, automatic coal scales, and hand-adjusted weighers. It does not appear that there is any autographic coal meter on the market, although it would appear that such a one would be of distinct use, especially in connection with mechanical stokers. Among water-flow meters, the V-notch weir meter has recently found much favour, as it may be combined with a feed-water heater. Other water-meters described are operated under the Pitot principle, the Venturi principle, and the principle of volume measurement in tanks. Steam-flow meters applied to individual boilers show the instantaneous steaming rate. A meter attached to each boiler of a battery of boilers will show if any boiler is "loafing." The Pitot and Venturi principles are also made use of in steam-flow meters. In the St. John meter the flow takes place through an orifice in which is a conical plug. A difference of pressure of about 2 lb. is maintained. When the flow increases the plug rises, and thus gives an increased area of orifice. A lever system connects the plug to the recording pen.

The forthcoming books of the *Oxford University Press* include:—The Cures of the Diseased in Remote Regions. Reproduced in facsimile from the original issue of London, 1558, with introduction and notes by C. Singer; Origin and Meaning of some fundamental Earth Structures, by C. P. Berkey; Contributions to the Ethnology of the Salish Tribes, by J. A. Teit; Architectural Acoustics, by W. C. Sabine; Scientific Management, by C. B. Thompson; The Evolution of Modern Medicine, by Sir W. Osler; Geography of Eastern Asia, by D. Paton. *Messrs. Crosby Lockwood and Son* announce, in their "Manuals of Chemical Technology":—Chlorine and Chlorine Products, by Dr. G. Martin, with a chapter on Recent Oxidising Agents, by G. W. Clough; Sulphuric Acid and Sulphur Products, by Dr. G. Martin and J. L. Foucar; The Salt and Alkali Industry, by Dr. G. Martin and S. Smith, with chapters on the Stassfurt Industry and Potassium Salts, by F. Milsom. Further books of science *to be issued by the Cambridge University Press* are:—A Student's Book on Soils and Manures, by Dr. E. J. Russell, illustrated (Cambridge Farm Institute Series); Archæological Excavation, by J. P. Droop (Cambridge Archæological and Ethnological Series); Ticks: a Monograph of the Ixodoidea, part iii., the Genus Hæmaphysalis, Bibliography of the Ixodoidea, ii.; North America during the Eighteenth Century: a Geographical History, by T. Crockett and B. C. Wallis, illustrated; Cambridge Elementary Arithmetics, by J. H. Webster, Teacher's Books V., VI., and VII.; A First Course of Geometry, by Dr. C. Davison; Experimental Physics: a Text-book of Mechanics, Heat, Sound, and Light, by Dr. H. A. Wilson, illustrated (Cambridge Physical Series); An Introduction to Applied Mechanics, by E. S. Andrews, illustrated (The Cambridge Technical Series); Ships, Shipping, and Fishing: with some Account of our Seaports and their Industries, by G. F. Bosworth, illustrated (Cambridge Industrial and Commercial Series).

A catalogue of books and papers on economic zoology and other subjects just issued by Messrs. J. Wheldon and Co., 38 Great Queen Street, W.C., contains the titles of many works of interest to naturalists. We notice that complete sets of reports and other publications difficult to obtain are offered at reasonable prices, and also rare works on fish and fisheries, marine biology, and economic entomology. Librarians and private workers who consult the catalogue will find in it a number of volumes well worth purchasing.